

REMARKS

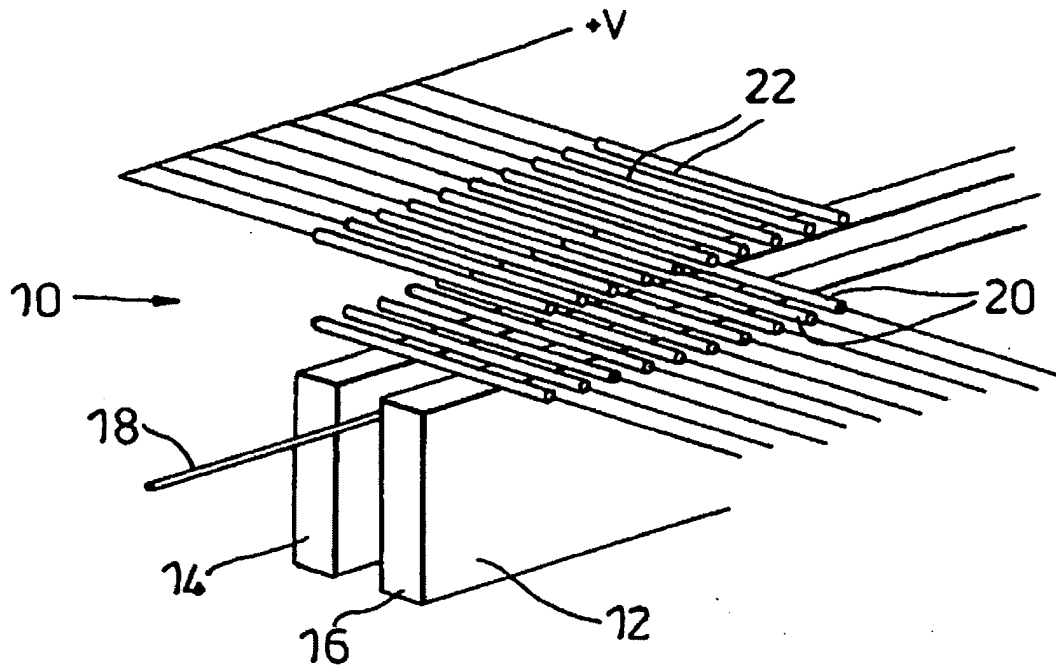
Applicant thanks Examiner for her review of the present application. In the present response, Applicant has amended claim 1 to clarify the differences between the present invention and the cited references, has canceled claims 14 and 15, and has submitted a Request for Continued Examination.

Claim Rejections

Examiner has rejected claims 1, 3-9, 11, 29, 30, and 34-37 as being anticipated by Brettschneider (U.S. Patent No. 5,259,014). Examiner has further rejected the remaining claims as being obvious over Brettschneider by itself or in combination with certain references, namely Gravelle (U.S. Patent No. 5,633,907), which was used to reject claims 14-22 and 31-33.

Applicant's Invention

As shown in the Figure below, Applicant's electron source includes an emitter wire (18) enclosed in a suppressor (14, 16). A plurality of extraction elements, here shown as a number of parallel wires (20), extend perpendicular to the emitter wire (in a parallel plane), and a plurality of focusing elements, here shown as a number of wires (22) parallel to the extraction wires (20), are spaced apart at equal spacing to the extraction wires (20). The extraction wires are connected by means of switches to a positive extracting potential or a negative inhibiting potential, and the switches are controlled so that at any one time a pair of adjacent wires (22) are connected together to form an extracting pair, which produce an electron beam. The position of the beam is moved by switching different pairs of grid wires to the extracting potential.



The focusing elements, which may also be elongate and are preferably parallel to the extraction elements, are arranged to focus the beams of electrons after they have passed the extraction elements. More preferably the focusing elements are aligned with the extraction elements such that electrons passing between any pair of the grid elements will pass between a corresponding pair of focusing elements. Note that the focusing elements serve to not only focus electrons but also protect the emitter member from reverse ion bombardment from an anode. See Specification, paragraph 0014.

Extraction elements which are at a positive potential relative to the emitter serve to extract electrons. The other extraction elements, which are negative with respect to the emitter, tend to force emitted electrons back towards the emitter. After passing between the two extracting elements, the formed beam is attracted towards, and passes between the corresponding pair of focusing elements. The positive potential of the focusing elements can be varied to vary the position of the focal line thereby to vary the width of the beam when it hits the anode.

It should be appreciated that the ability to focus and direct the beam is dependent upon applying the right potential to the extraction elements and, correspondingly, to ability the right potential to the corresponding set of focusing elements.

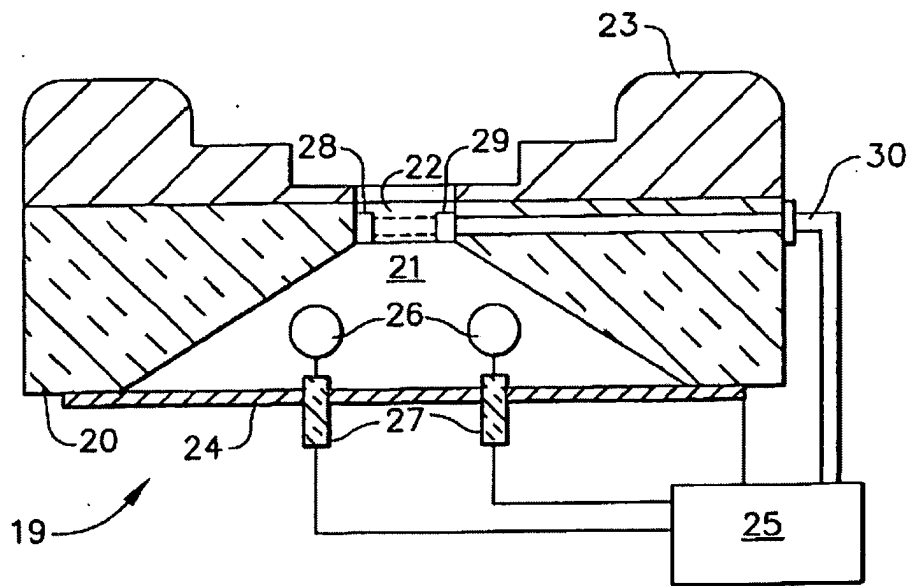
Claim Amendments

Applicant has amended claim 1, and therefore all claims, to expressly include the focusing elements described in the specification. In particular, all claims now include the following limitation: *a plurality of elongate focusing elements in a third plane, wherein the third plane and second plane are substantially parallel and separated by a contiguous space defining a second region and wherein said focusing elements focus beams of electrons after they have passed the extraction elements.*

Cited References and Reasons for Allowance

Examiner has rejected claims 14-22 and 31-33 as being rendered obvious by a combination of Brettschneider and Gravelle. Examiner claims that, while Brettschneider does not have focusing elements, Gravelle's alleged focusing elements could be combined with the Brettschneider structure to meet the claimed invention. Examiner further states that, even though the combination does not disclose other additional elements, such as an elongate focusing element or the parallel position of the focusing element, such limitations would be obvious to one of ordinary skill in the art.

Applicant respectfully disagrees. Gravelle applies an electric field to generated electrons in a manner that is completely different than the present invention. As shown in the Figure below, Gravelle discloses a cathode assembly 19 that comprises a cylindrical member 20 that includes a large hollow cavity 21 therein with a sole, small rectangular exit passage 22 leading directly from cavity 21 and member 20. Note that the exiting pathway is from cavity 21 through passage 22. The annular electrode member 23 fits concentrically on cavity member 20 so that egress from cavity 21 through passage 22 as well as through annular member 23 is unobstructed. Member 23 is connected by an appropriate electrical conductor (not shown) to a source of electric power and serves as the principal electrode to establish a primary electric field between cathode assembly 19 and an anode.



A further electrode member 24 extends across cavity 21 opposite passage 22 and serves as a negatively biased forcing field electrode for focusing electrode assembly 19. Forcing field electrode 24 is connected to electric power supply 25 and given an electric negative bias to accelerate electrons out of cavity 21 through passage 22 and into the primary anode-cathode electric field. A supply of electrons in cavity 21 is provided by thermionic emission means such as from one or more thermionic filaments 26 in cavity 21. Thermionic filaments 26 are positioned between forcing field electrode 24 and passage 22. The exiting electron cloud from passage 22 is caught up in the primary field between cathode assembly 19 and anode 13 to become electron beam 16. Note that the electrons are “forced” out using member 24 and then an electric field is applied to those forced electrons using cylindrical member 23. Gravelle does not disclose any elongate focusing elements in a plane parallel to the extraction elements with a contiguous space between them.

Brettschneider is completely different and incompatible with Gravelle. First, Brettschneider does not “force” electrons from behind the emitter. Rather, it pulls electrons, which is a completely different approach. As such, one of ordinary skill in the art would have not viewed these two different approaches as being combinable. Second, even if one were to try to combine the two very different systems, one would not end up with the “focusing elements” of the claimed inventions. On the contrary, at best, one of ordinary skill in the art would have

applied a cylindrical force field generator to an emerging stream of electrons. This approach is fundamentally different than the claimed invention because it applies a uniform field to the emerging electrons, regardless of where those electrons are emerging or where they need to be focused. In the present invention, by using a multitude of different focusing regions (created by the use of a plurality of focusing elements), finer directional control over the emitted electrons can be exerted.

Accordingly, Applicant respectfully submits that the combination of Gravelle and Brettschneider do not disclose Applicant's invention and, in fact, teach a very different system of extraction and focusing than is currently being claimed.